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SOVIET MACHINE BUILDING

NO. 14

SELECTED TRANSLATIONS

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Introduction

This is a serial publication containing selected translations on machine building in the Soviet Union. This report contains translations on subjects listed in the table of contents below.

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1. Milling and Boring Automatic Line

/Following is a translation of an article by G. A. Bushmich in Mekhanizatsiya i Avtomatizatsiya Proizvodstva (Mechanization and Automation Industry), No. 2, February 1960, pages 9-10; CSO: 2900-N/11 (8)./

At one of the establishments of the Sverdlovsk Council of National Economy an automatic line for machining cranks, designed by SKB-1 and produced at the Moscow Machine Tool Plant imeni Ordzhonikidze, has been in successful use for a long time. Prior to the adaptation of the automatic line, the cranks were machined on universal machines.

The line consists of a group of machines and other units connected with a pulsator conveyor, joined by a common automatic cycle of operation for the performance of the technological operations without the participation of workers. It is intended for milling the planes of the head and ear, drilling openings, and machining two-side grooves in the cranks. The line consists of eight machines with eleven power heads having twelve spindles. In addition, the line has a loading-unloading device and a swivel table. The simultaneous displacement of ten parts along the positions is accomplished by a conveyor above the machine, which has a pitch of 1,600 millimeters, equal to the distance between the machines. The line has 47 hydraulic and 10 pneumatic cylinders, 29 paddle hydropumps, 18 hydropanels, eight cooling pumps, and 30 electric motors with a total capacity of 196.5 kilowatts. The dimensions of the line are as follows: length 17,280 millimeters, width 5,740 millimeters, height 3,000 millimeters; the weight is 96 tons. The area occupied is 99.4 square millimeters. Fig. 1 shows a general view of the line.

From an intermediate roll table, the part is fed by a swivel crane to the rollers of the loading position; the part is pushed along these rollers into the swivel loading device which gives it a vertical position. The lifter is then lowered and it grabs the part by the stamped recess on the head. The lifter then moves upward. It is displaced by the carriage of the conveyor one step, and the part is lowered into the clamping device of the working position, which is under the lifter.

After lowering the part, the cams of the lifter separate and it returns to the original position. The part is

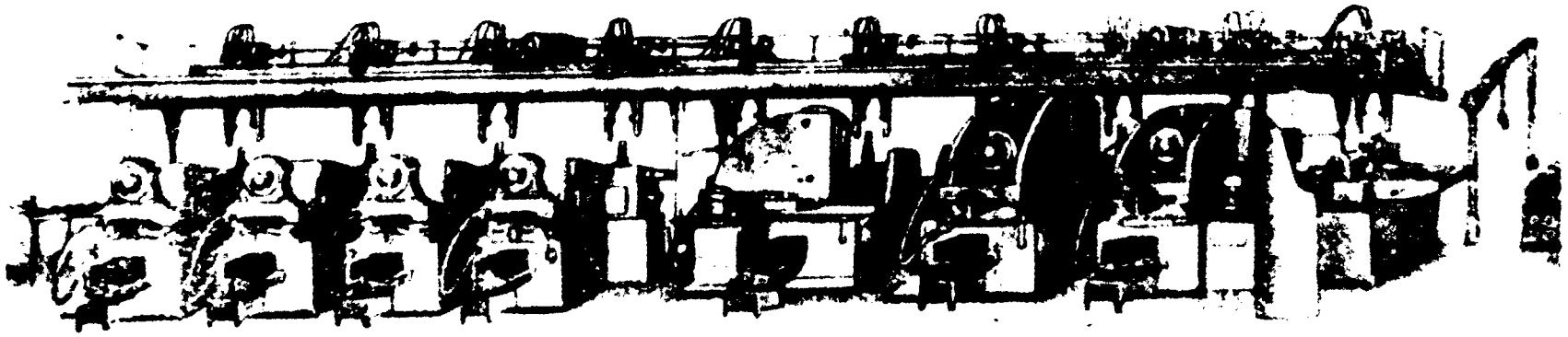


Fig. 1. General View of the Milling and Boring Automatic Line

gripped in the device by a turning support. In this position, the part is transported and gripped at all the positions of the first section up to the swivel table.

This section accomplishes the machining of the outside parallel planes with two end milling cutters on a two-spindle horizontal machine, the machining of the outside parallel planes of the ear on a single-spindle horizontal milling cutter with a set of end cutters, the machining of the area on the bridge of the crank with an end cutter with a vertical position of the spindle and the cutting of the gap in the ear on a single-spindle horizontal cutting machine.

After the milling, the part proceeds to the swivel table where it is turned 90 degrees and takes up a position in which further machining proceeds on drilling and boring machines. Drilling of the central opening in the head is accomplished on a horizontal drilling machine.

Rough and finish boring of the head recesses is accomplished on two-side, two-spindle horizontal boring machines with special counterbores.

On all the machines of the line (with the exception of the first and third), the machining is accomplished by a high-speed instrument with cooling of the emulsion. Cooling is included only during the working feed of the heads. On the first and third machines, the machining is accomplished with hard-alloy milling cutters without cooling.

The line machines two parts which differ from one another by the presence or absence of an ear. The parts with the ear are machined on all the machines of the line, while those without the ear are machined on the second and fourth machines. In this case, the machines are disconnected by block switches on a central control panel. The cooling of the instrument of these machines is stopped at the same time.

At the end of the machining, on the last machine of the line, the part is fed into a similar loading-unloading device which places it in a horizontal position. The part is then pushed out by a special pneumatic pusher onto the roll table.

The machines which constitute the line are special, but their design makes wide use of unified units and parts of machine installations.

2. Automatic Lines of Broaching Machines

/Following is a translation of an article by A. F. Gorbatsevich in Mekhanizatsiya i Avtomatizatsiya Proizvodstva (Mechanization and Automation Industry), No. 2, February 1960, pages 5-9; CSO: 2900-N/11 (9)./

Up to now, automatic lines of broaching machines were not produced in the Soviet Union. During the development of the first lines, the designers of the Special Design Bureau No. 8 of the Minsk Plant of Automatic Lines, under the leadership of the author, had occasion to seek fundamentally new solutions of the loading-unloading devices and to reconstruct certain broaching machines to adapt these devices for the line.

The first automatic line, a general view of which is shown in Fig. 1, was developed, in accordance with the technical assignment of the Khar'kov Plant "Sickle and Hammer," for machining the rocker arm of the valve of the SMD-1 Diesel tractor engine. The line was produced by the Minsk Plant imeni Kirov and was put into operation at the plant "Sickle and Hammer." It consists of three broaching machines. The first machine is a vertical machine, model MP-56, and was specially developed for the line; the remaining two are mass produced by the plant imeni Kirov.

The first machine broaches an opening with a diameter of $28^{+0.033}$, which is first drilled to a size of 27 millimeters; the second machine broaches two plane areas, and the third broaches a radial surface. The greatest allowance of 2.5-3 millimeters is taken off during the second operation.

In order to accomplish the first operation, a special machine, model MP-56, shown in Fig. 2, was designed. The design of a special machine resulted from the need for an automatic cycle and high output.

The machine represents a special vertical-broaching semiautomatic machine for internal broaching; it is equipped with a swivel table and an automatic unloading device. The frame of the machine is of welded construction. The frame and pedestal of the table are mounted on a common base of welded construction, which is utilized at the same time as a reservoir for the cooling emulsion. The tank of the hydraulic unit is situated in the frame, above the level of the installation of the hydraulic pump of the main drive; this precludes the possibility of sucking air into the hydraulic system of the machine. The electric equipment of the machine and

line is distributed in the recess of the table pedestal.

In view of the fact that the level of the table is at a height of two meters from the base, a special platform is provided for the line operator for the sake of convenience. The platform has a seat. At the level of the hands of the operator, there is a table for the blanks which are to be loaded into the machine. In front of the operator, there are the control panel for the machine and line and the fixtures for the local illumination of the working zone of the machine.

In each of the four positions of the swivel table there are six parts. Loading is accomplished in the first position, which is opposite the operator; the second position is in the zone of broaching; the third, intermediate; and the fourth, unloading. In changing positions, the table turns 90 degrees counterclockwise. The recesses in the positions of the table are so ar-

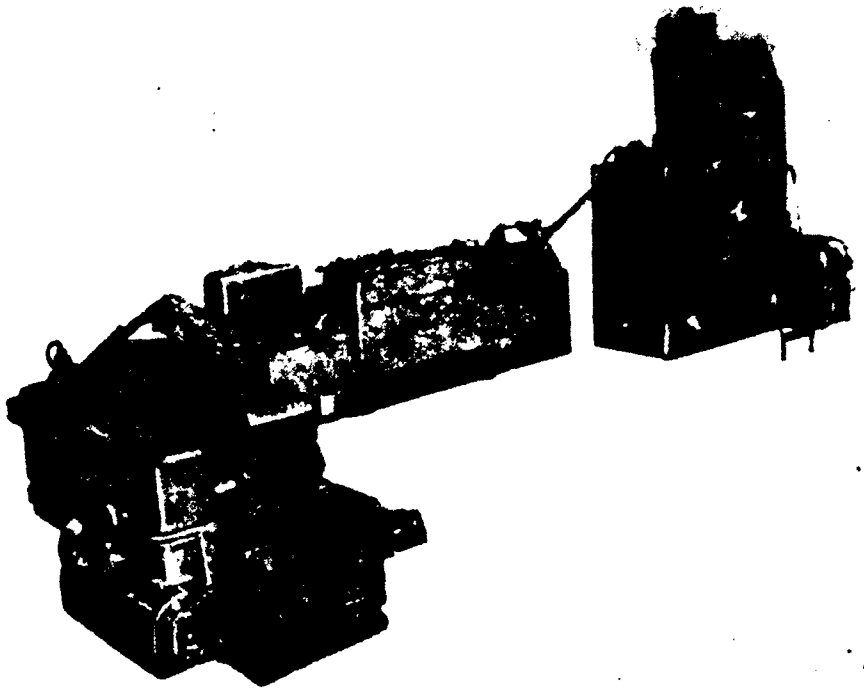


Fig. 1. General View of the Automatic Line for Machining the Rocker Arm of Valves.

ranged that an incorrect installation of the part in the recess is excluded and the parts are prevented from falling out during the turning of the table. The machine operates as a semiautomatic machine with hand loading and automatic unloading. For the start of the cycle, the operator presses the starter button each time after the parts are placed in the recess of the loading position. By pressing this button, the operator, in essence, gives the command for the solution of the following cycle of the machine.

Since the cycle begins with the turning of the table, this condition must be fulfilled for the safety of the operator. Immediately after the turning of the table, the auxiliary carriage begins moving downward and leads the ends of the broaches into the openings of the parts and further into the chucks of the working carriage. Moreover, the first tooth of the broach falls short of reaching the upper end of the part by about five to seven millimeters. Then, the working carriage goes into action and the parts are broached. The displacement of the carriages and the broaching proceed with a variable speed.

In order to obtain a high-quality broached surface, the speed is reduced to about two meters/minute at the end of the broaching; the last finish teeth of the broach and the calibration teeth operate at this speed. The passage of the nonworking end of the broach is accomplished with a maximum speed which can be assured by the output of the pump of the main movement of the machine, i.e., about seven meters/minute.

At the end of the downward movement of the working carriage, a command is given for the removal of the table from the working zone. The table turns 90 degrees. Its removal from the working position is necessary in order to return the broaches to the upper position. The table is in the removed position until the working and auxiliary carriages reach the extreme upper position. Then, the table reaches the working position and brings the next group of parts into the broaching zone.

The unloading of the parts in the unloading position takes place during the downward course of the carriages.

...The horizontal broaching machines of the continuous broaching model MP-11 are used as the base models of the second and third machines of the line. The MP-11 machine has a massive frame of rigid construction with a drive pull chain situated therein. The pull or power chain is drawn on two sprocket gears, one of these sits on the drive roll, and the other on the roll of the drawing station. The drive roll is connected by means of a couple to a reducer, and the latter with the roll of the drive electric motor. The upper

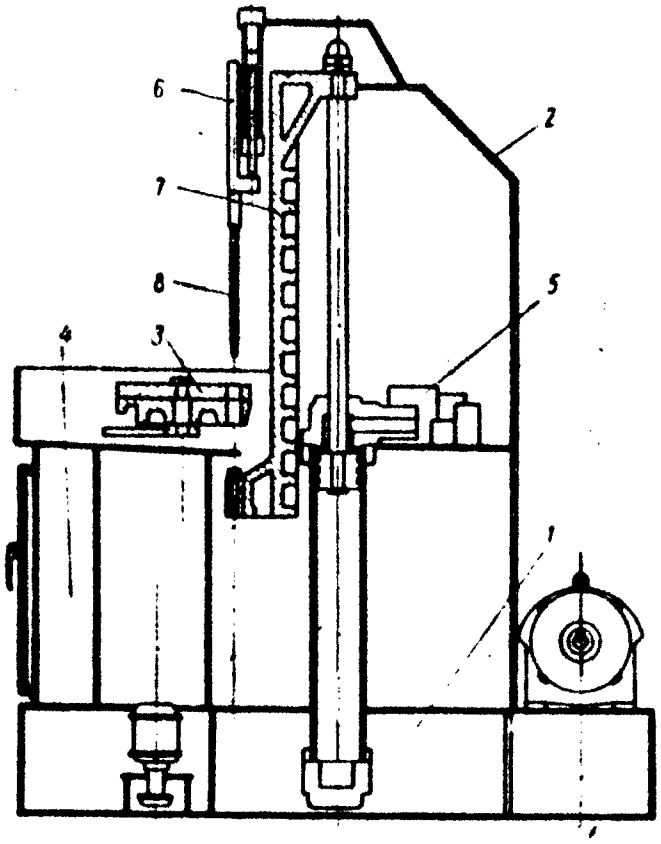


Fig. 2. Cross-Sectional Diagram of the M11-56 Machine:

1--base; 2--frame; 3--swivel table; 4--electric equipment; 5--hydraulic drive; 6--auxiliary carriage; 7--working carriage; 8--broach

leading branch of the pull chain passes into a special tunnel which is formed by the lower and upper portions of the frame. A broach in a special instrument plate is secured on the upper portion of the frame. The broach changes very rapidly. Its adjustment can be accomplished outside the machine.

In order to assure the inclusion of MP-11 machines in the automatic line, it was necessary to design instrument adjustments, clamping devices, and loading and unloading devices which connect the machines with one another. The parts proceed to the first MP-11 machine, as mentioned above, from the

MP-56 machine.

Since the chain of the MP-11 machine moves continuously, the loading of the parts in the devices which are on the chain can be accomplished at definite moments when the recess for the part in the device is opposite the part ready for loading. With this in mind, above the chain of the machine with the devices for clamping the parts one more chain is placed with special grips lowered into the tray on which the parts move to the first MP-11 machine from the MP-56 machine.

There are provisions in the line for various signals and blockings for observing the operation of all the machines and transport devices; moreover, all information on malfunctions in the line is transmitted to a central control panel situated on the first machine at the working post of the operator. Signaling is accomplished by means by colored indicating lamps. In addition to the central control panel of the line, each machine has small adjustment panels. The adjustments of the MP-11 machines provide for the possibility of a rapid change on the instrument; adjustment of the instrument plates is accomplished during the operation of the line. This reduces the nonproductive losses of time. For an efficiency of 0.75, the line gives 800 parts per hour. The weight of all the units is 28 tons. The dimensions of the line are as follows: length 10,000 millimeters, width 5,400 millimeters, height 3,726 millimeters. The established capacity of all the electric motors is 58 kilowatts.

The second automatic line of broaching machines was designed by SKB-8 and was produced (like the first) at the Minsk Machine Tool Plant imeni Kirov for the Krasnoluch Machine-building Plant. The line was intended for machining the body of the cutter of a coal combine by means of broaching. In coal combines, these parts are used in large numbers. The output of the line is 1,300 parts per hour. The gap under the hard-alloy plate and the lower supporting plane of the part are subjected to machining.

The line consists of two horizontal broaching machines of the continuous broaching model MP-11. A characteristic of the given line is the use of bunker loading on both machines, which assures the given output. In solving the problem of bunker loading, the main task was to find a method of orienting the part in order to feed it into the machine. The cutting tool has such a form that the part, when placed in the tray with slopes of about 30-35 degrees, slides freely along the tray until it reaches an obstacle in the form of a small threshold on the bottom of the tray in one position, while in the other three positions it is retained. This property of the part formed the basis of the design of the loading device. The bunker of the plank type is made in two sect-

ions. The parts are thrown into the first section. Then they are grabbed by the plank, raised upward; they fall into the sloping tray where they slide downward until they reach the small threshold. A correctly oriented part passes further downward along the tray to the loading zone of the machine.

3. Model 1L38 Semiautomatic Line for Machining Track Link Bushings For the S-80 Tractor

/Following is a translation of an article by E. S. Shul'kina in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 15-18; CSO: 2900-N/11 (10)./

The Special Design Bureau No. 1 has designed and the Machine Tool Plant imeni Ordzhonikidze has produced for the plant of tractor spare parts (city of Cheboksary) a semiautomatic line, 1L38, for machining of track link bushings for the S-80 tractor. The line includes the following operations: cutting off the blank from the pipe, boring the opening, turning on the top,

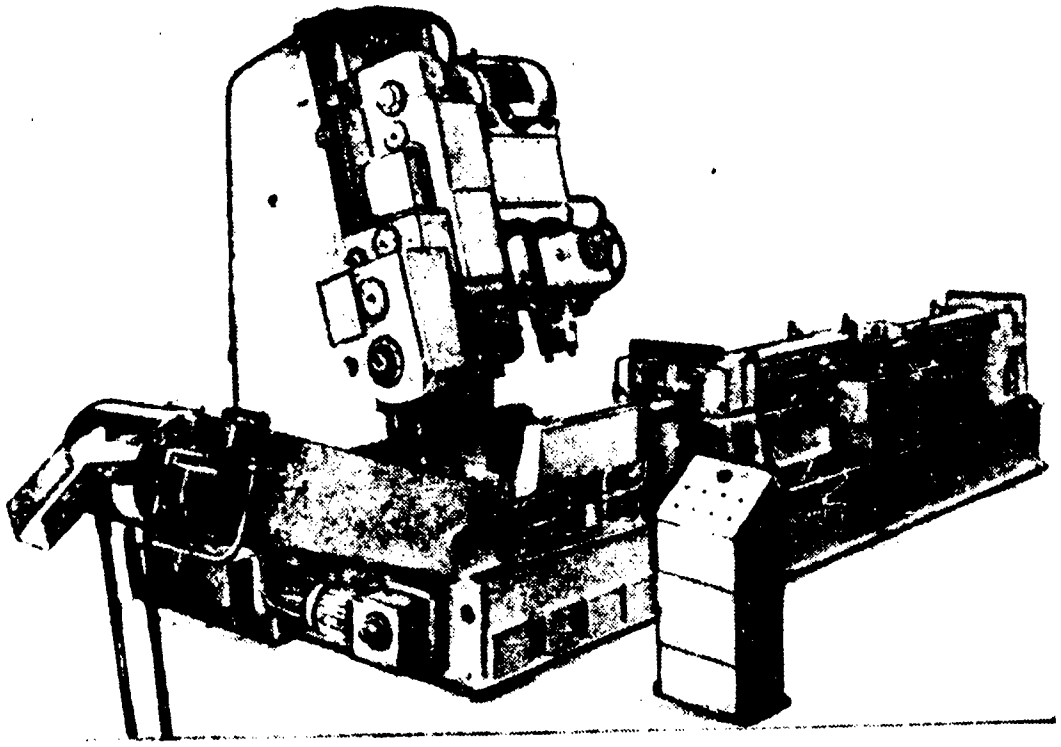


Fig. 1. Model 1L38S1 cut-off machine

and marking the parts.

The line consists of three groups of metal-cutting machines connected among themselves by means of three inter-machine conveyors and a press for marking the parts. Each group of machines performs similar operations.

The first group of machines consists of four cut-off machines, model 1L38S1 (Fig. 1). These machines are universal semiautomatic machines intended for cutting pipes from 40 to 67 millimeters in diameter into measured blanks. The pipe to be cut moves automatically into the device from the magazine and is fed to the dead support in the device by means of a conveyor. The pipe should be measured so that its end will be a thin ring which should be carried out by the screw conveyor along with the chips. In the 1L38 line, the diameter of the pipe being cut is 67 millimeters and the length 3813 millimeters.

The machine cuts two pipes at the same time, and one cycle gives six blanks of track link bushings; the operating cycle of the machine is automatic.

In adjusting the machine from machining one shape to machining another, the following units are employed: device, conveyor for feeding the pipes, magazine for pipes, set up (arbor with a set of saw disks).

The second group of machines consists of four model 1L38S2 special, two-side horizontal, eight-spindle-boring, drum machines of which accomplish boring of the opening, undercutting of both ends, and chamfering the openings in the bushings (Fig. 2).

The 1L38S2 boring machine is a semiautomatic machine in which only the loading of the part into the tray is done by hand. The feeding of the blanks into the device, clamping and machining, unloading of the parts from the device, and turning of the four-position drum are all performed automatically. The feeding of power heads is hydraulic; the clamping of the part--from the hydraulic switch.

The third group of machines consists of three model 1L38S3 duplicating semiautomatic machines, which perform the outside turning of the bushings or similar parts (Fig. 3). The hydro-duplicating support with the tracking device and a mechanism for the adjustment of the pattern assure the required profile of the processed part and its diametral dimensions.

The parts are placed in the magazine of the machine by hand. The issue of the part from the magazine, its installation in the center, as well as the clamping, machining, and unloading of the part from the device are all accomplished automatically.

In adjusting the machine to machine another part, the

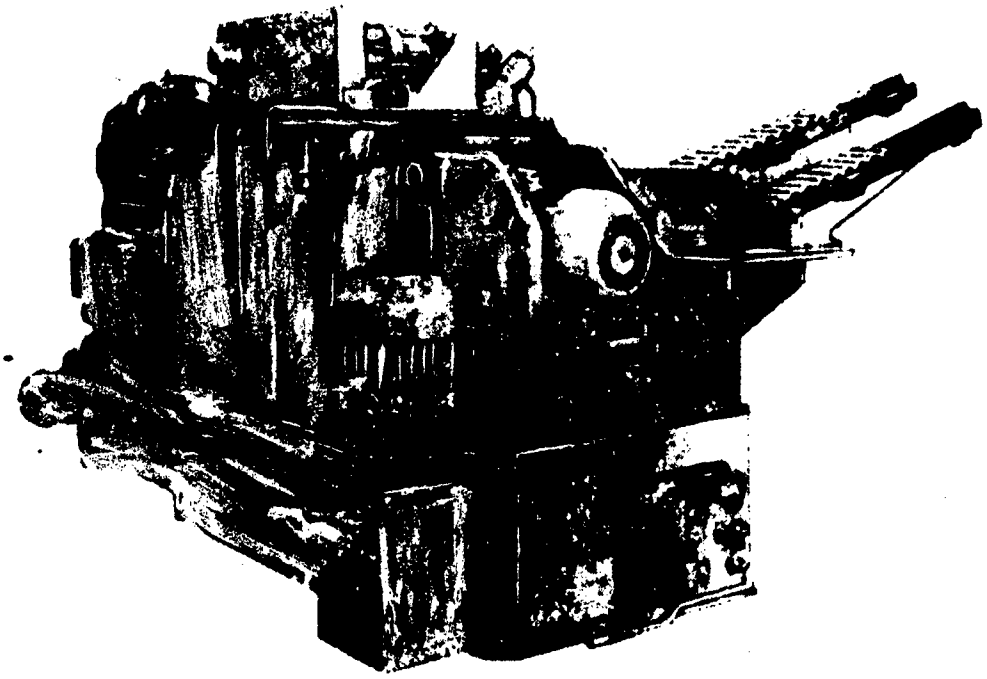


Fig. 2. Boring machine model 1Б382

following units are changed: clamping device, lever of the loading device, grab of the "mechanical hand." The number of turns of the spindle is varied by switching two blocks of pinions and interchangeable pinions.

The chips are removed from each machine by screw conveyors which dump the chips on a common shop conveyor. Cooling is individual at the cut-off and boring machines. On the duplicating machines, the work is accomplished without cooling. Control of the parts is selective.

Marking is carried out on an 1Б3884 press with a pressure of 16 tons. The press is equipped with a device for turret feeding and a special adjustment designed for the given part. The marked part is dumped through an opening in the table into a tare for transportation to other shops.

Intermachine conveyors, which carry the parts from the cut-off machines to the boring machines and from the boring machines to the duplicating machines not only perform the functions of a carrier of the blanks from one group of machines to another, but also

act as accumulators of interoperational extent in case of a malfunction of one or of several machines.

The conveyor which carries the parts from the duplicating machines transfer the parts in only one direction--to the press.

The adaptation of the semiautomatic lines for processing bushings of track links of tractors has made it possible to reduce the necessary production area and the number of workers engaged, as well as to increase labor productivity.

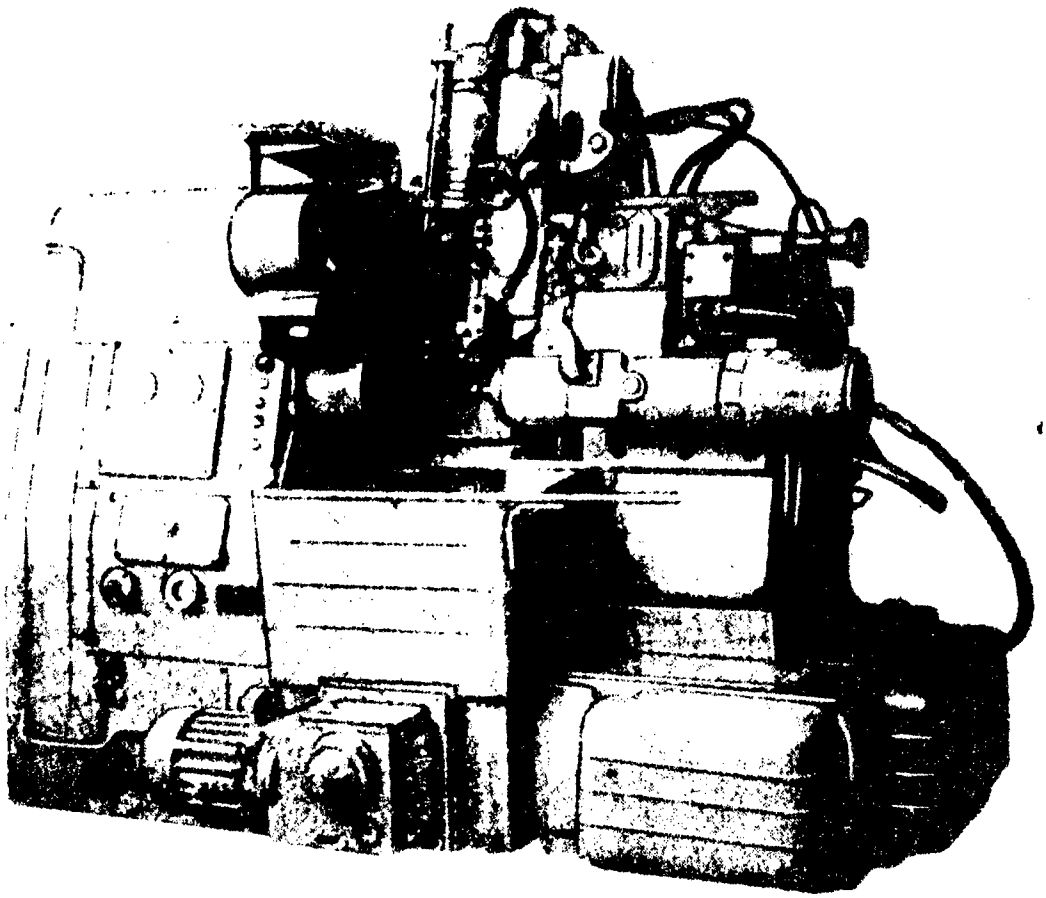


Fig. 3. Duplicating semiautomatic machine, model 1L3683

Technical characteristics of the machines

	Models of machines		
	1L38S1	1L38S2	1L38S3
Number of simultaneously operating saw disks	3–6	—	—
Diameter of saw disk, mm	350	—	—
Number of turns of saw disk per minute	20	—	—
Feeding of cutter head, mm/min	8–100	—	—
Number of parts:			
loaded into each tray	—	20	—
loaded onto each face	—	2	—
Length of part being processed, mm	—	—	175,6
Diameter of part, mm	—	—	65,3
Working number of turns of the spindle per minute	—	—	760
Speed of longitudinal working feed, mm/min	—	—	570
Output of machine for 80-85% loading, pieces/hour	93,4	90	96
Number of electric motors	6	6	4
Total capacity of electric motors, kwt	25,35	30,6	13,2
Dimensions of machines, mm:			
length	7325	4000	2540
width	2580	2185	2235
height	3200	1805	2000
Weight, tons	18	7,63	4,0

4. Model 3A153A Cylindrical Grinding Automatic Machine

/Following is a translation of an article by A. V. Shchegolev in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 11, November 1959, pages 33-35; CSO: 2900-N/11 (11)./

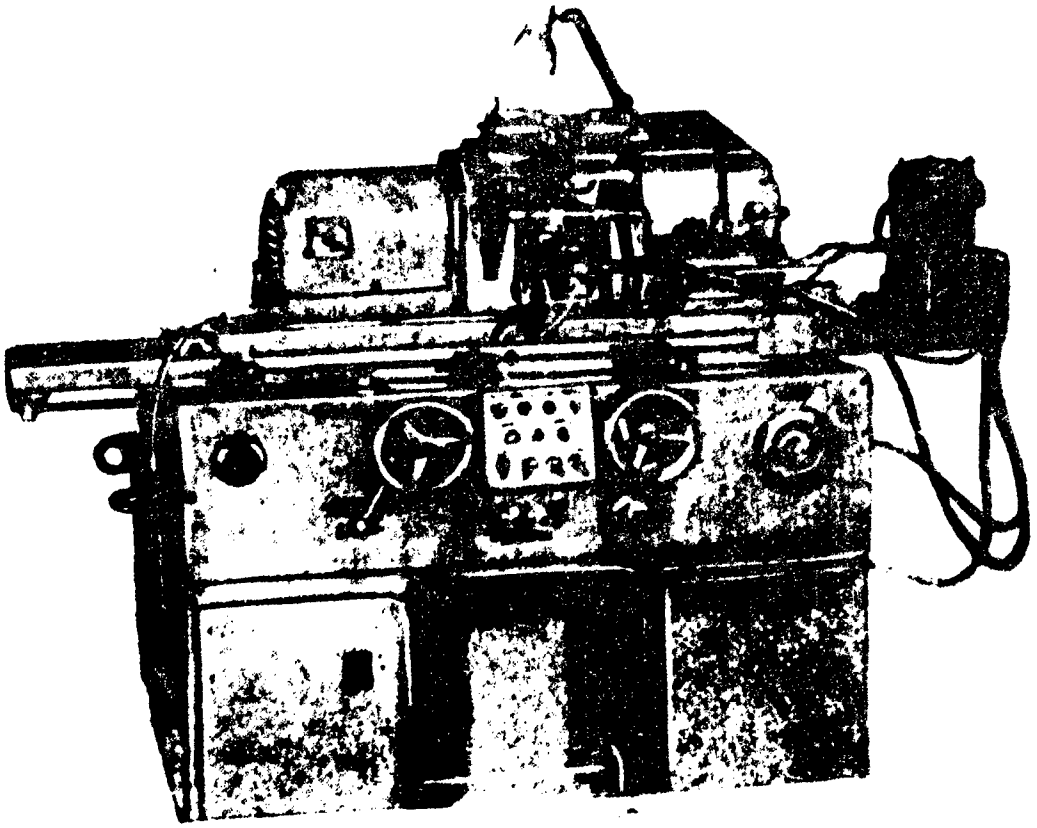
The model 3A153A machine, produced by the Leningrad Machine Tool Plant imeni Il'ich in accordance with drawings of the division of the main design plant, is intended for plunge-cut grinding of stepwise and smooth rollers with a length of simultaneous grinding of up to 50 millimeters.

The entire grinding process on the machine (see illustration) takes place automatically in the following sequence: The rollers being treated are placed in the receiver of the loading mechanism on the table of the machine; then the rollers are successively fed by means of a lever system to the place of finishing, where they are installed in the centers of the head and tail stocks and are clamped by a driver chuck. After finishing, also by means of a lever loading mechanism, the ground roller is directed into a removing tray.

Depending on the required accuracy of finishing, the ground surface is measured automatically by means of a special electrical measuring instrument installed on the table of the machine, or the grinding driver chuck is fed to the rigid support. In this and in the other case, as the allowance is being removed from the roller, the feed mechanism automatically changes the grinding conditions--from rough to finish. During operation with the measuring instrument, after finish grinding, superfinishing also takes place; during operation to the rigid support, "pulling through" takes place, i.e., work without feeding. At the end of finishing, the mechanisms of the machine are returned to the original position; then the cycle is repeated.

This machine has a rapid connection and disconnection of the grinding wheel; moreover, contact of the grinding wheel with the roller being ground is controlled by a maximum-current relay. The relay switches the rapid shifting of the grinding wheel to the rough feed.

Dressing of the grinding wheel is automatic and takes place periodically after processing of the rollers in a definite number, which is controlled by means of a calculating relay. The number of turns of the stock spindle of the shape has an infinitely variable control and can be varied during



Model 3A153A cylindrical grinding automatic machine

operation by a turn of the handle.

For greater convenience in operation and to reduce the auxiliary time, a mechanism for balancing the grinding wheel has been installed on the machine. Almost all the mechanisms of the machine are hydraulic, which assures smoothness of operation. Due to the high rigidity of the main units, the machine is capable of rapid grinding.

As a result of complete automation of the grinding process, the machine can be built into automatic machine lines or continuous sections.

Technical characteristics of the automatic machine

Length of the shape being processed..100-300 mm
Diameter.....20-40 mm
Height of centers above the table....80 mm
Dimensions of the grinding wheel:
maximum.....400x50x203 mm
minimum .....270x50x203 mm
Number of turns of grinding wheel:
during rapid grinding.....2500 and 2900 per minute
during ordinary grinding.....1750 and 2100 per minute
Limits of numbers of turns of the stock of the shape.....100-950 per minute
Capacity of electric motors:
of the drive of the spindle of the grinding wheel.....4.5 kwt
of the hydraulic drive.....1.7 kwt
of the drive of the spindle of the stock of the shape.....0.7 kwt
Over-all dimensions (length x width x height).....2060x1500x1400 mm
Weight.....2600

5. Model 19S20A Centerless Cylindrical Grinding Automatic Machine

/Following is a translation of an article by S. M. Bonin in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 11, November 1959, pages 35-37; CSO: 2900-N/11 (12)./

The model 19S20A, centerless cylindrical grinding automatic machine was designed by SKB-6 of the Moscow Municipal Council of National Economy and was produced by the Vitebsk Machine Tool Plant imeni Kirov. The machine is intended for grinding cylindrical and sectional (with complex profile) shapes by methods of through-feed and cut-in grinding. The machine is adapted to automatic lines.

Technical characteristics of the automatic machine

Diameter of parts being ground.....3-75 mm
Grinding wheel:
  outside diameter.....400-500 mm
  height.....150-200 mm
  outside speed.....35
Regulating wheel:
  outside diameter.....260-300 mm
  height.....150-200 mm
  number of turns:
    during operation.....16-12 06
    during truing and dressing.....300 06

Feed of grinding stock during cut-in grinding from 0.25 to 6 mm/min

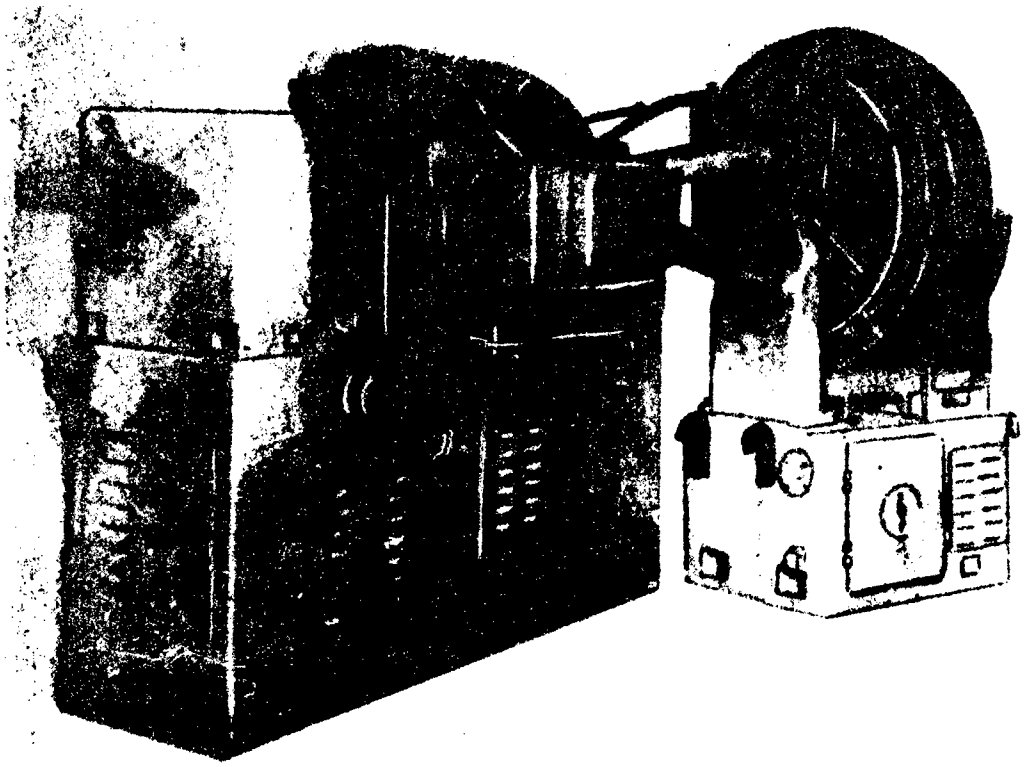
Capacity of electric motors:
  of grinding wheel.....14 kwt
  of regulating wheel..... 1 kwt
  gear boxes of automatic feed.....0.25 kwt
  of hydrostation.....2.8 kwt
  of electric pump.....0.15 kwt
Over-all dimensions (length,x width x height).....2400x1775x1645 mm
Weight.....5 tons

Grouping of the automatic machine makes it possible to true and dress the grinding and regulating wheels directly in the working space along the lines of contact of the wheels with the shapes being ground; consequently, there is an increase in their accuracy. Moreover, there is assurance of dimensional stability of the shapes being ground after truing and dressing of the grinding wheel without compensation of the variation of the wheel dimension; this is particularly important when the automatic machine is being adapted to the automatic line.

6. Model VSh-62M Automatic Machine for Grinding Balls

/Following is a translation of an article by Ts. B. Linkovskaya in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 24-25; CSO: 2900-N/11 (13)./

In 1959 the Vitebsk Machine Tool Plant imeni Kirov produced an automatic machine intended for machining raw balls prior to hardening (soft grinding) and hardened balls (hard grinding) measuring two to 12 millimeters.



Model VSh-62M Automatic Machine for Grinding Balls

The body of a converging inserted tooth which serves for gathering the balls is secured in the slit of the faceplate of the stock of the fixed disk. A

distributing apparatus intended for the distribution of the flow of the balls along the concentric channels of the disk instrument is mounted in the lower portion of the body. For each size of ball, there is a definite distribution apparatus. From the converging inserted tooth, the balls proceed along the inclined chute onto the sorting device. In this device the balls, brought to the desired dimensions, fall through the rules into a container, while the undermachined balls of large dimensions roll off along the chute into an elevator for further processing.

Technical Characteristics of the Machine

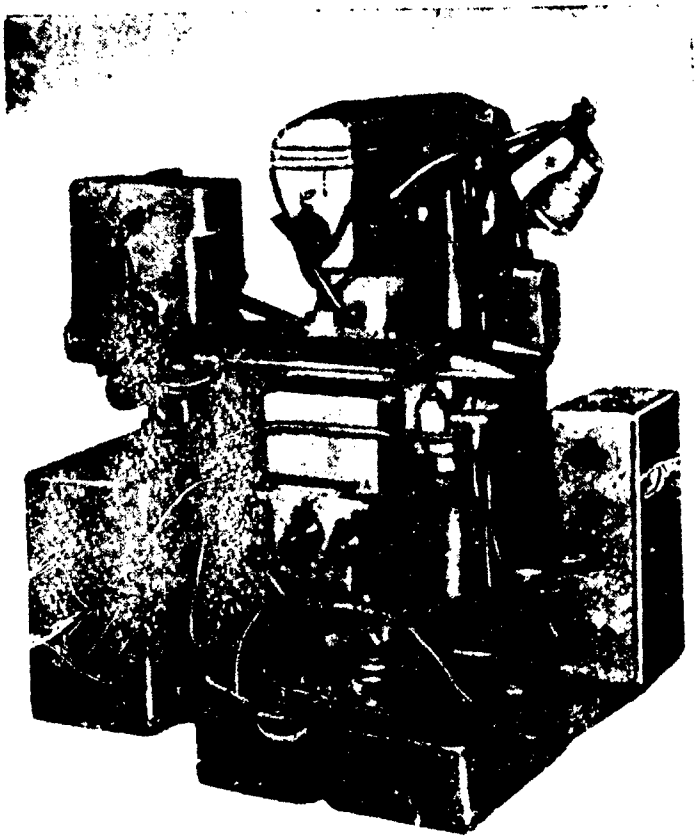
Dimensions of the grinding wheel (D x d x h)	600x290x100 mm
Speed of rotation of the grinding wheel	60; 85; 120; 175; 245; 345
Dimensions of the disk instrument	600x250x100 mm
Limits of the numbers of turns of the drum	1.31-5.3 per min.
Weight of the loaded lot of balls	100 kg
Capacity of electric motors, kwts:	
of grinding wheel	10
of elevator	0.6
of hydraulic drive	1.0
of cooling pump	0.125
Over-all dimensions (length x width xheight)	2890x1640x1540 mm
Weight (with the elevator)	4100 kg

Improvement in the construction of the machine--installation of a sorting device, the use of an original device for cleaning the cooling liquid, strengthening of the hydraulic elements--made it possible to increase the output of the machine 1.53 times, thus, the output was brought up to 46 kilograms of balls in place of the 30 kilograms previously processed by the machines.

7. Model DF-143 Semiautomatic Machine for Milling Grooves in Rotors of Rotary Pumps

/Following is a translation of an article by V. I. Krivonosov in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 30-31; CSO: 2900-N/11 (14)./

In 1958, the Dmitrov Plant of Milling Machines produced a model DF-143 semiautomatic milling machine (see illustration), which was designed by the special design bureau No. 3 of the Odessa Council of National



Nodel DF-143 Semiautomatic Machine for Milling Grooves in Rotors of Rotary Pumps

Economy. The semiautomatic machine is intended for milling 12 grooves in the rotors of the rotary pumps which are being produced by the Yeletsk Plant of Machine Tool Hydraulic Apparatus. The machine is capable of milling a different number of grooves of rotor and also of processing the grooves in other parts which have a configuration similar to the rotors of rotary pumps. All the operations of milling the grooves, with the exception of setting the rotor (on mandrel) in the center, are automatic.

The semiautomatic machine consists of a frame with a base, gear boxes, dividing device, tail stock, table with carriages, cantilevers, hydraulic unit, division panels, hydraulic communications, electric equipment, and cooling system. In grouping, the semiautomatic machine represents a horizontal milling machine, on the table of which there are a dividing device and a tail stock.

All the operating displacements of the table, cantilever, and the movement of the dividing device are accomplished by means of hydraulic drive. The frame and the gear boxes of the DF-143 semiautomatic machine are unified with the model 680M horizontal milling machine.

Technical Characteristics of the Semiautomatic Machine

Distance from the spindle axis to the table:	
minimum	300 mm
maximum	330 mm
Distance from spindle axis to the bar	125 mm
Maximum course of the table	290 mm
Range of speed of the spindle (eight stages)	47-530 r par
Range of working feeds	30-300 mm/min
Capacity of electric motor of main drive	2.2 kwt
Over-all dimensions (length x width x height)	1335x1200x1425 mm
Weight	1300 kg

In processing a rotor made of 20Kh steel and having 12 grooves 11 millimeters long, width two millimeters and length 18 millimeters, the calculated time for one part was 4.4 minutes. In testing the machine during operation with large-teeth milling cutters, this time was reduced.

8. Models 6C112, 6C114, and 6C118 Special Unit-Type Machines

/Following is a translation of an article by M. S. Chizhova in Byulleten' Tekhniko-Ekonomicheskoy (Bulletin of Technical-Economic Information), No. 11, November 1959, pages 28-31; CSO: 2900-N/11 (15)./

In accordance with the assignment by the Gor'kiy Automobile Plant in 1958, the special design bureau No. 6 of the Moscow Municipal Council of National Economy designed, amd the Plant imeni C. Ordzhonikidze produced and furnished to the customer a group of models 6C112, 6C114, and 6C118 special unit-type machines intended for machining parts of the "Volga" automobile.

The model 6C112 machine is intended for drilling, boring, and undercutting the ends of the leading bushing of the valve; model 6C114 is intended for drilling, boring, countersinking, chamfering, and threading the crankshaft; model 6C118 is intended for boring openings in the pistons under the piston rings.

Technical Characteristics of the Machines

Criteria	Models 6C112	6C114	6C118
Number of power heads	2	2	2
Number of electric motors	5	7	3
Total capacity of electric motors, kwts	11	24.1	14.6
Number of spindles	28	31	16
Number of positions of the rotating drum	6	10	5
Number of parts simultaneously machined at each position of the drum	4	1	2
Output of the machine, pieces/hour	--	40	120
Over-all dimensions, mm:			
length	4300	6780	4960
width	1300	1580	1900
height	1870	2485	1300
Weight, tons	10	16	--

The use of multiposition rotating drums increases considerably the output of the special unit-type machines, improves labor techniques, and raises the quality of the products.

9. Models ZA107 and ZA108 Machine Tools for Machining Fittings

/Following is a translation of an article by G. D. Zapriyev in Byulleten' Tekhniko-Ekonomicheskoy (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 28-29; CSO: 2900-N/11 (16)./

In 1959, special two-side horizontal boring and self-tapping machine tools, models ZA107 and ZA108, have been produced by the Moscow Machine Tool Plant imeni S. Ordzhonikidze from the design of the first design bureau of unit-type machine tools and automatic lines. The machine tools are intended for the machining of fittings: tees (All-Union Standard 757) and crosses (All-Union Standard 763). Each of the machines can be set for one of the two type of dimensions: 1-1/2" or 1-1/4". The machines perform countersinking of the necks of the fittings, chamfering, and cutting threads.

The machines have an automatic cycle of operation and are equipped with mechanized loading magazines designed for 15-20 minutes of uninterrupted operation. This makes it possible for one worker to service several machines.

Technical Characteristics of the Machines

Output	120 parts per hour
Total capacity of six electric motors	
of model ZA107 machine	24.75 kwt
of model ZA108 machine	29.75 kwt
Capacity of magazines	34 parts
Number of working positions	8
Number of spindles:	
on the model ZA107 machine	12
on the model ZA108 machine	16
Over-all dimensions (length x width x height)	4280x2700x1720 mm
Weight	10.1 Fans

This type of machine has up to now not been produced by domestic plants.

Previously, universal drilling and turret lathes equipped with devices were used for machining fittings. In particular, over 100 universal drilling and turret lathes were required, entire nomenclature of the fittings produced

by the Kosogorsk Metallurgical Plant imeni Dzerzhinskiy. These lathes were used rather uneconomically; for example, the turret heads have a total of two instruments.

The use of automatic machines for the machining of fittings will lower the cost of their production, lighten the labor of the workers, and reduce waste.

10. Small Screw-Cutting Lathe

/Following is a translation of an unsigned article in Narodnoye Khozyaystvo Kazakhstana (National Economy of Kazokhstan), No. 2, February 1960, page 29; CSO: 2900-N/11 (17)./

The special design bureau of machine tool production of the Izhevsk Machine-building Plant has designed a small screw-cutting lathe, model IZh-250, which will serve as a base for the creation of a range of various other small lathes, including the IZh-250T lathe, the IZh-2500P operating lathe, the IZh-250R turret lathe, and the IZh-250G hydraulic lathe. These small machines make it possible to replace a large part of the large machines and to free a considerable production area.

The handles and control panel of the machine are in the work zone of the work location. The speeds are varied during the operation (without stopping the machine). The carriage can be disconnected by either the left or right hand of the lathe operator; automatic stoppage also occurs during the turning and during the screw cutting.

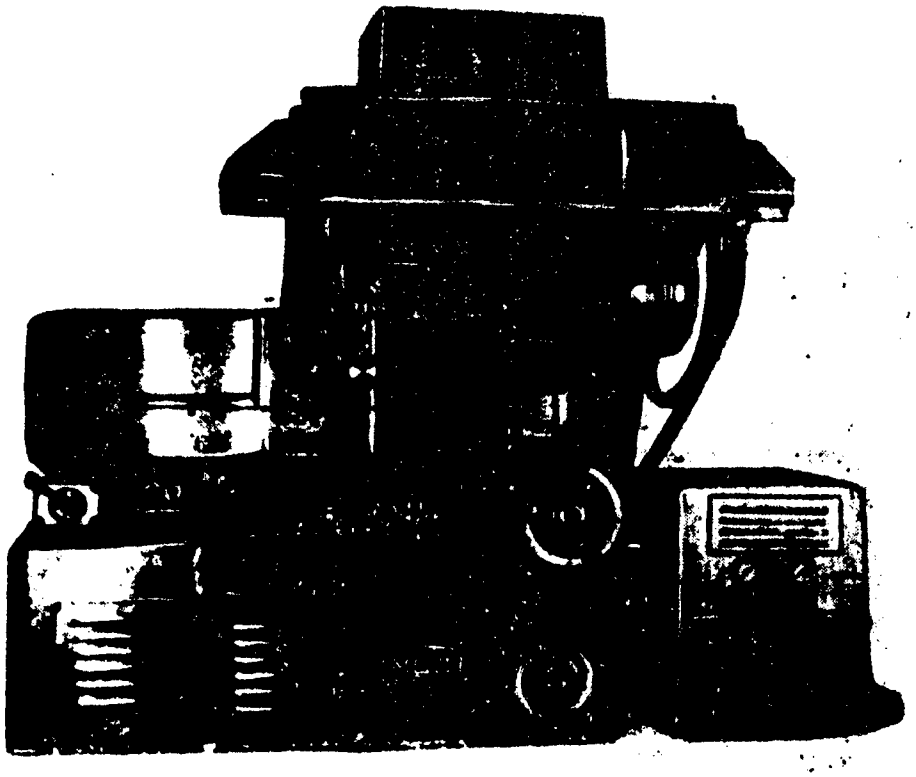
The IZh-250 machine, which has been tested under production and laboratory conditions, can be conveniently controlled. It is universal in operation, and adequately performs various turning and screw-cutting operations with sufficient accuracy and high output. Moreover, it is simple in design, and its manufacture is not complex.

The first series of IZh-250 machines has already been produced.

11. Model MSh-167 Surface-Grinding Machine

/Following is a translation of an article by L. I. Savinov in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 22-23; CSO: 2900-N/11 (18)./

In accordance with the design of the special design bureau No. 3 (Odessa), in 1959 the Moscow Plant of Grinding Machines (MSZ) produced and released the model MSh-167 surface-grinding machine with a horizontal spindle and a round electromagnetic table (see illustration). The parts being ground can be secured on the electromagnetic plate or in special devices, depending on the material, form, and dimensions. The materials of the parts being machined can be steel, cast iron, or non-ferrous metals.



Model MSh-167 Surface-Grinding Machine

Technical Characteristics of the Machine

Maximum dimensions of surfaces being ground (height x diameter)	100x500
Magnitudes of automatic feeds	0.016; 0.032; 0.08
Number of turns of the table	70; 92; 142
Over-all dimensions (length x width x height)	2470x1375x1545
Weight	2570

Depending on the wishes of the customer, the machine can be made with an electromagnetic table or with a cast iron table and a special adjustment for securing the sahpes. The small over-all dimensions and weight and the convenience of servicing make it possible to utilize the machine in mobile repair shops (on automobiles).

12. Model KZh-20 Wheel-Milling Machine

/Following is a translation of an article by N. A. Zubov in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 18-20; CSO: 2900-N/11 (19)./

The model KZh-20 deep-boring machine, which was designed by the special design bureau No. 2 of the Leningrad Council of National Economy and produced by the Kramatorsk Plant of Heavy Machine Tools, is intended for machining the rims of wheel pairs without rolling them out from under the locomotives and cars. It eliminates the laborious operation of dismounting the wheel pairs for renovation.

The machine is installed in railroad depots on a foundation situated below the level of the rails. When the machine is not in operation, the locomotive can pass over it.

The milling cutter has been designed by the All-Union Scientific Research Institute of Instruments. The body of the cutter has 12 grooves, with teeth with the profile of the rim of the wheel pair. Each tooth has ten hard-alloy cutter-rollers 16 millimeters in diameter. When dull, the cutters can be turned on their axis at a certain angle, this increases the cutting period. The cutters allow for 16 turns.

Technical Characteristics of the Machine

Diameters of the wheel pairs being machines	650 1350
Length of the axis of the wheel pair	2300 2600
Limits of circular feed	60-400
Time required to machine a wheel pair	60
Capacity of motors	45
Over-all dimensions, plan view	4465x6080
Weight (with hydraulic and electric equipment)	30

All auxiliary movements are mechanized; as a result, the machine operator does not have to do any heavy work.

The saving realized from reductions in the machining cost and reductions in the idle time of locomotives and cars during repairs of wheel pairs amounts to tens of millions of rubles per year.

13. Model KZh-11 Deep-Boring Machine

/Following is a translation of an article by E. M. Gorodetskiy in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 11, November 1959, pages 31-33; CSO: 2900-N/11 (20)./

A special model KZh-11 (see illustration) deep-boring machine was produced in 1958 for machining large-size metal molds of rollers of rolling mills at the Kramatorsk Plant of Heavy Machine Tools; it was designed by the division of the plant's main designer. The machine carries out boring and undercutting of the ends of cast-iron molds with an inside diameter from 500 to 1,500 millimeters, a length from 2,000 to 5,000 millimeters, and a weight of up to 60 tons.

The design characteristics of the machine are as follows: the units of the machine are arranged independently and are not connected with the common frame; a portion of the units is mounted directly on a foundation; boring is accomplished by means of a differential boring bar with a mechanical drive of rotation and feed of the cutting head; the shape being machined is positioned with a tail stock transverse to the axis of the machine and a cantilever situated differential boring bar.

Technical Characteristics of the Machine

Height of centers above level of the floor	1350
Maximum distance between ends of spindle of head stock and center of tail stock	6250
Maximum displacement of tail stock in transverse direction	1650
Dimensions of differential boring bars (diameter x length)	550x6200 250x3400
Maximum diameter of parts installed in prisms	2100
Capacity of main drive	55 kwt
Over-all dimensions (length x width x height)	11270x4050x2600
Weight	48

Production of the machine has made it possible to machine especially large molds and has increased the output during machining of metal molds of medium sizes by more than two times.

14. Model 1594 Universal Two-Column Vertical Boring Machine

/Following is a translation of an article by M. A. Samokhvalov in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 11, November 1959, pages 21-23; CSO: 2900-N/11 (21)./

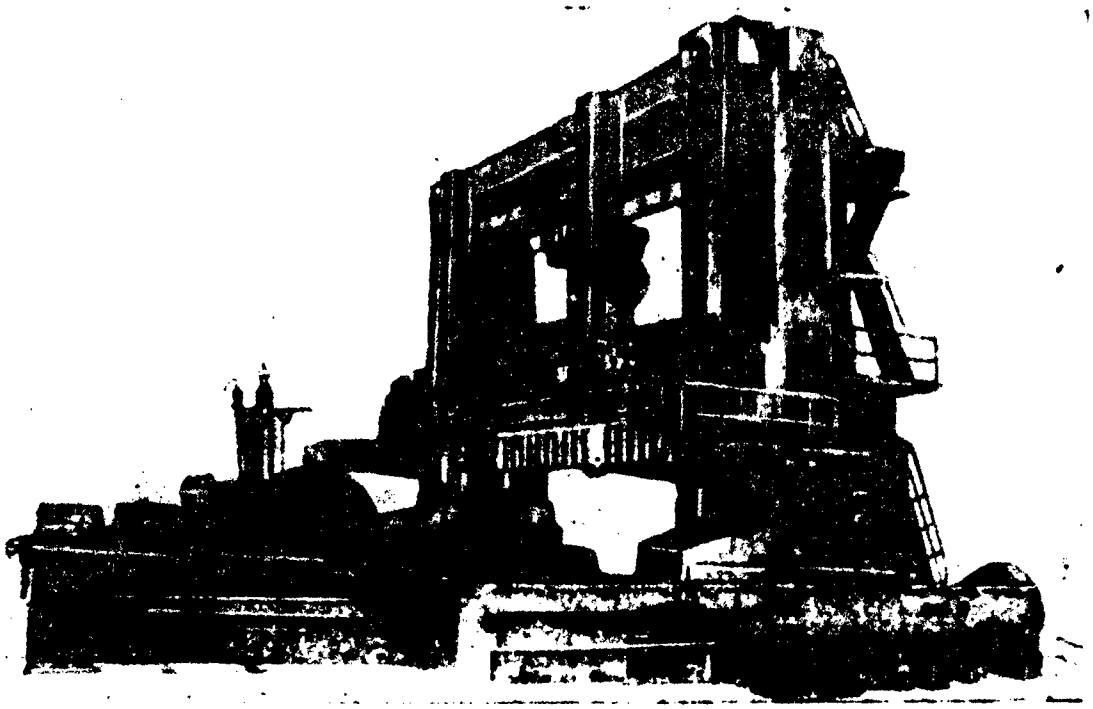
In accordance with the design of the special design bureau No. 11, in 1958 the Kolomna Plant of Heavy Machine Tools produced model 1594 (see illustration) a universal two-column vertical boring machine intended for high-speed turning of large-size shapes (the maximum diameter of the shape is up to 20 meters).

The machine accomplishes turning and boring of cylindrical surfaces; turning of planes (ends) and grooving. (In both cases, machining can be accomplished at the same time by two carriages having independent drives of horizontal and vertical feeds); turning of conical surfaces with the turn of the carriages; turning of curvilinear surfaces by the method of automatic duplication with pattersn. The machine can be used for roughing as well as for finishing work.

The wide range of continuous control, with a range for the drive of the faceplate equal to 1:64 and with a range for the drive of the carriages equal to 1:4200, makes it possible to select advantageous and efficient conditions for machining during the machining of diverse shapes from different materials. The machine is equipped with a mechanism for stopping the carriage or sliding block in a definite position on rigid supports. The register mechanism on the control panel serves for remote-control counting of the magnitude of displacement of the cutter in horizontal and vertical directions.

With respect to the accuracy of its work, the machine assures a surface finish of up to ▽6, and with respect to shapes having a diameter up to 1,000 millimeters, deviations up to 0.04 millimeters from the cylindrical.

The following are furnished with the machine when specially ordered and for a separate charge: carriage on a column which assures -- depending on the installation of the column (near the machine or on one of the faceplates) -- turning and boring of cylindrical surfaces, undercutting of ends, turning of conical surfaces; cutter carriage -- for milling and drilling in the vertical and horizontal planes and for boring in the vertical plane; devices for centering



Model 1594 Universal Two-Column Vertical Boring Machine

large-size shapes during installation on the faceplate and for reading the angle of turn of the faceplate during the machining of the shapes with an incomplete turn of the faceplate (for example, during drilling, milling, etc.).

Technical Characteristics of the Machine

Maximum diameter of boring:	
for normal position of the portal	16000
for the extreme rear position of the portal	20000
Maximum allowable height of shape being machined on the machine	6300
Maximum allowable summary force during cutting	140 260
Drive of the table:	
number of mechanical steps	3
range of control of infinitely variable electric motor	1:4
limits of numbers of turns of central and annular faceplates per minute	0.005-9 0.0013-3.06
Crosspiece	
maximum vertical displacement	5260
speed of displacement	130
Portal:	
maximum displacement	7500
speed of displacement	194
Gear boxes:	
limits of feed per turn of central and annular faceplates	0.003-664 0.01-2630
minute feed	0.03-126
Vertical carriages:	
maximum distance between axes of slide blocks	18300
minimum distance between axes of slide blocks	
without cutter carriage	2940
with cutter carriage	5660
without cutter carriage and duplicating carriage	1560
maximum course of slide blocks along the vertical	3750
limit angles of turn of carriages	±30° -10°
Capacity of main electric motor	105x2 150
Over-all dimensions (length x width x height) above floor level	26270x21300x15340
Weight	1400

15. Model OS-177 Machine for Precision Boring of Crankcases

/Following is a translation of an article by V. I. Shekhter in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 2, February 1960, pages 20-22; CSO: 2900-N/11 (22)./

In accordance with the design of the special design bureau No. 3, the Odessa Plant for Radial Drill Lathes has produced for the Moscow Plant "Compressor" a model OS-177 machine (see illustration) for precision (diamond) boring of openings under the sleeve of cylinders in the crankcases of cooling compressors.

The base for the machining are the openings under the main bearings of the crankshaft and the end of this opening. The angle of slope of the openings is maintained in the blank and during precision (diamond) boring; the part is set out by means of a center searcher through a turn of the table in accordance with a previously machined opening.

The given machine differs from ordinary machines for precision boring by virtue of the vertical displacement of the boring head and of the swivel table, which makes it possible to machine one- and multi-row crankcases with linear and star-shaped distribution of the cylinders.

The machine operates in accord with a semiautomatic cycle. The correct sequence of the cycle of the machine and the impossibility of breakage of the instrument and spoilage of the shape being machined are assured by blockings which are provided in the hydraulic and electric systems of the machine.

Technical Characteristics of the Machine

Diameter of openings being machined	200-250
Maximum possible length of boring	709
Number of spindles	1
Distance from axis of spindle to the table	270-700
Number of turns of the spindle	135
Maximum length of course of the table	800
Maximum angle of turn of the table	360°
Feed of the table during rough and finish boring	6.7 13.5

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Capacity of electric motors, kwt	
of hydraulic pump	1
of rotation head	1.7
of turn of the table	1.7
Over-all dimensions (length x width x height)	3550x2020x3685
Weight	14

Model OS-177 machines are superior to the universal boring machines with respect to the accuracy of the installation of the spindle and the table. This is attained by means of a special drum support for fixing the position of the boring head with respect to the height and an indicator and center finder for the final turn of the table. An accurate and rigid spindle head with the sleeve and small cantilever extension of the cutters assures high accuracy and finish of the surface being machined.

16. KZh-21 and KZh-22 Drilling and Boring Machines

/Following is a translation of an article by E. M. Gorodetskiy in Byulleten' Tekhniko-Ekonomicheskoy Informatsii (Bulletin of Technical-Economic Information), No. 11, November 1959, pages 26-28; CSO: 2900-N/11 (23)./

Models KZh-21 and KZh-22 widely unified drilling and boring machines (see illustration), which were designed and produced in 1958 by the Kramatorsk Plant of Heavy Machine Tools, are intended for deep drilling in solid metal and for boring openings, broached or cast in the rolls of turbines, rollers of rolling mills, press columns, spindles of heavy machine tools, etc. Drilling in solid metal is accomplished by combination drilling-boring heads and boring by multiple cutting tool heads with one-side distribution of the cutting tools.

As distinct from the existing groupings of deep-boring machines, in the model KZh-21 and KZh-22 machines, the leading stocks with non-hollow spindles are distributed on movable plates and can be shifted along the axis of the machine with a speed of two meters/minute.

Drilling and boring are accomplished with copious emulsion cooling which also serves for washing out the chips. The capacity of the emulsion installation consists of up to 500 liters per minute under a pressure up to 15 atmospheres. The emulsion groove is situated along the shank frame of the machine. Oiling of the main units is centralized from the individual pumps. The main movements of the machine are remote controlled and originate on the panel on the gear box and the button station of the leading stock. The model KZh-21 and KZh-22 machines have 11 electric motors with a total capacity, respectively, of 185 and 225 kilowatts. The maximum cross section of the chips taken off during boring of openings is 100 square millimeters.

Technical Characteristics of the Machines

	Model KZh-21	Model KZh-22
Maximum diameter of boring, mm	500	500
Maximum length of boring, m	10	20

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	Model KZh-21	Model KZh-22
Limits of outside diameters of the shapes being machined, mm	400-1200	500-1500
Maximum weight of the shapes, tons	35	100
Limits of numbers of turns of the shapes, rpm	1.25-80	1-63
Limits of number of turns of the shank, rpm	12.5-125	12.5-125
Limits of feeds of shank stock, mm/min.	0.5-250	0.5-250
Capacity of drive of rotation of the shape, kwt	60	100
Length of displacement of the leading stock along the frame, m	7	15
Over-all dimensions (length x width x height), m	3501x3610x2815	5435x361x3115
Weight, tons	139	200

The output of the model KZh-21 and KZh-22 machines increased by 40-60 percent in comparison with the output of similar machines.

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FOR REASONS OF SPEED AND ECONOMY

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